

102 : Mathematics

No	Questions	Marks	
Unit -1			
1	Define Equivalent set with illustration(4 times)	02	D15
2	Define power set with illustration	02	M15
3	Explain Cartesian product of two non-empty sets with illustration	02	M15
4	Define difference of two non-empty sets with illustration	02	M15
5	Explain proper sub set of non-empty sets with illustration	02	D14
6	Define symmetric difference of two non-empty sets with illustration	02	D14
7	Define improper subset with illustration	02	D12
8	Define equal and equivalent sets with illustration	02	D13
9	Write the set of all vowels in English alphabets which precede S.	01	M13
10	Define improper subset with illustration	01	M13
11	Write no. of elements in the power set of a null set	01	D12
12	Define complement set with illustration	01	D12
13	If $A = \{ a, b, c, d, e \}$ then write no. of subsets in power set of A	01	M12
14	If $A = \{ 4, 5, 6 \}$, $B = \{ 1, 2, 3 \}$ then find $(A - B) \cap (B - A)$	01	M12
15	Define subset of a set with illustration	01	D11
16	If $A = \{ 1, 2, 3 \}$, $B = \{ 2, 4, 6 \}$ then find $(A \cup B) - (A \cap B)$	01	D11
17	Prove that $(A')' = A$	01	M11
18	Verify distributive law of union of $A = \{ x / x \leq 5 ; x \in N \}$ over intersection of $B = \{ x / x^2 \leq 9 ; x \in Z \}$ and $C = \{ x / -1 \leq x \leq 4 ; x \in N \}$	05	D15
19	In usual notation, prove that $A \times (B \cup C) = (A \times B) \cup (A \times C)$ (3 times)	05	D15
20	If $A = \{ a / a^2 - 1 < 10 ; a \in N \}$, $B = \{ b / b - 1 < 2 ; b \in N \}$ and $C = \{ c / c \leq 1 ; c \in Z \}$ that verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$	05	D15
21	If $U = \{ x / x \in N ; x \leq 10 \}$, $A = \{ x / x \in N ; x^2 < 10 \}$, $B = \{ 2, 4, 6 \}$, $C = \{ x / x^3 - 3x^2 - 4x = 0 \}$ Then verify that i) $A \cap (B - C) = (A \cap B) - (A \cap C)$ ii) $A' - B' = B - A$	05	D15
22	Prove that i) $A - (A - B) = A \cap B$ ii) $(A')' = A$	05	D15
23	A town has a total population of 50,000 persons and of them 28000 read 'Gujarat Samachar' and 23000 read 'Sandesh' while 4000 read both the papers. Prove that there are 3000 persons who read neither of both.	05	D15
24	State and prove Distributive law for union over intersection(4 times)	05	M15
25	If $A = \{ x / x \leq 5 ; x \in N \}$, $B = \{ x / x^2 \leq 9 ; x \in Z \}$ and $C = \{ x / -1 \leq x \leq 4 ; x \in N \}$ then verify $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	05	M15
26	If $A = \{ x / x \leq 3 ; x \in N \}$, $B = \{ x / -1 \leq x \leq 2 ; x \in Z \}$ and $C = \{ x / x^2 - 5x + 6 = 0 ; x \in R \}$ considering $U = R$, verify De Morgan's Law for intersection	05	M15
27	If $A = \{ x / x \leq 3 ; x \in N \}$, $B = \{ x / 2 \leq x \leq 4 ; x \in N \}$ and $C = \{ 1, 3, 4 \}$ then prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$	05	M15
28	In a college, there are 500 girls and of them 300 have taken Economics and 250 have taken Mathematics. How many of them have taken both the subjects? All girls have taken at least one of these two subjects.(3 times)	05	M15
29	State and prove Distributive law for intersection over union(2 times)	05	D14

- 30 If $A = \{x/x \leq 4; x \in N\}$, $B = \{x/x^2 \leq 4; x \in Z\}$ and $C = \{x/-2 \leq x \leq 3; x \in N\}$ then prove that $A - (B \cap C) = (A - B) \cup (A - C)$ 05 D14
- 31 If $A = \{2, 3, 4, 5\}$, $B = \{3, 4, 5, 6, 7\}$, $C = \{2, 4, 6, 8\}$ then verify $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ 05 D14
- 32 If $A = \{0, 1\}$, $B = \{-1, 0, 1\}$, $C = \{-1, 0, 1, 2\}$ then verify $(A \cup B)' = A' \cap B'$ 05 D14
- 33 State and prove De Morgan's Law for union(4 times) 05 M14
- 34 If $A = \{2, 3, 4\}$, $B = \{3, 4, 5, 6\}$, $C = \{2, 4, 6, 8\}$ then verify $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ 05 M14
- 35 If $A = \{1, 3, 4, 6\}$, $B = \{2, 4, 5\}$, $C = \{3, 5, 6\}$ then verify $A \cap (B - C) = (A \cap B) - (A \cap C)$ (3 times) 05 M14
- 36 If $U = \{x/x \leq 10; x \in N\}$, $A = \{x/0 \leq x \leq 5; x \in N\}$, $B = \{x/x \text{ is odd integer} < 10; x \in N\}$ then prove that $(A \cap B)' = A' \cup B'$ 05 M14
- 37 In a town, there is a 20-20 match between the team of Sachin and Dhoni. The town has total population of 5000 and of them 2800 supports Sachin, 2300 supports Dhoni while 400 support both the teams. Find how many supports neither Sachin nor Dhoni 05 M14
- 38 In usual notation, prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$ (3 times) 05 D13
- 39 If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5\}$, $C = \{1, 3, 5\}$ then verify that 05 D13
- i) $A \cup B = (A - B) \cup B$
 ii) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
 iii) $A \cap (B - C) = (A \cap B) - (A \cap C)$ (3 times)
- 40 If $A = \{x/x \in N; 2 < x < 6\}$, $B = \{x/x \in N; x^2 < 5x\}$, $U = \{x/x \leq 10; x \in N\}$ then prove that $(A \cap B)' = A' \cup B'$ and $(A \cup B)' = A' \cap B'$ 05 M13
- 41 In a class of 35 students, 17 have taken Maths, 10 have not taken Economics but Maths. Find the number of students who have taken both and the number of students who have taken Economics but not Maths. It is given that each student has taken either Maths or Economics. 05 M13
- 42 If $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$, $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6\}$, $C = \{1, 2, 5\}$ then find 05 M13
- i) $A' \cup (B - C)$
 ii) $A - (B' - C')$
- 43 Prove that $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$ 05 D12
- 44 If $U = \{x/1 \leq x < 10; x \in N\}$, $A = \{x/x^2 < 10; x \in N\}$, $B = \{x/x-1 < 4, x \in N\}$ then prove that 05 D12
- i) $A' \cup B' = (A \cap B)'$
 ii) $A' \cap B' = (A \cup B)'$
- 45 If $A = \{a/a^2 - 1 < 10; a \in N\}$, $B = \{b/b - 1 < 2; b \in N\}$ and $C = \{c/|c| \leq 1; c \in Z\}$ that verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$ 05 D12
- 46 A market research group conducted a survey of 2000 consumers and reported that 1720 consumers liked P_1 product and 1450 consumers liked P_2 product. What is the least no. of consumer that must have liked both the products 05 D12
- 47 If $A = \{2, 3, 4\}$, $B = \{x \in N/x < 5\}$, $S = \{1, 2, 3\}$, $T = \{x \in N/x \text{ is odd no. less than } 7\}$ then verify that $(A \times B) \cap (S \times T) = (A \cap S) \times (B \cap T)$ 05 D12

- 48 Let $U = \{u/3 \leq u \leq 13, u \in N\}$, $A = \{a/1 < a < 8, a \in N\}$, $B = \{b/b^2 = 25, b \in N\}$, $C = \{c/c \text{ is odd number between 4 and 8}\}$ then 05 M12
 i) Find A' and B'
 ii) Verify that $A - (B \cup C) = (A - B) \cap (A - C)$
- 49 If $A = \{x/x^2 - x - 2 = 0\}$ and $B = \{x/x^2 - 5x + 6 = 0\}$ then find $A \cup B$ and $A \cap B$ 05 M12
- 50 If $A = \{x/1 < x < 10, x \text{ is even number}\}$, $B = \{x/2 \leq x < 9, x \text{ is odd number}\}$, $C = \{x \in N/x^2 = 9\}$ then verify that $A \cap (B \cup C) = (A \cup B) \cap (A \cup C)$ 05 M12
- 51 If $U = \{x/1 < x < 10, x \in N\}$, $A = \{x/2 \leq x \leq 9, x \text{ is odd number}\}$, $B = \{3, 5, 6\}$ then prove that 05 M12
 i) $A' \cup B' = (A \cap B)'$
 ii) $A' \cap B' = (A \cup B)'$
- 52 If $A = \{x/x \text{ is a positive integer between 1 and 4}\}$, $B = \{x/x \text{ is a natural number between 1 and 5}\}$, $C = \{x/x \text{ is a odd natural number less than 6}\}$, $D = \{x/x \text{ is a even natural number less than 5}\}$ Then verify $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$ 05 M11
- 53 If $A = \{a, c, e\}$, $B = \{b, d\}$ and $C = \{a, f, g\}$ Then Verify that $A \times (B - C) = (A \times B) - (A \times C)$ 05 D11
- 54 If $A = \{x/x^2 - 2x - 3 = 0; x \in R\}$, $B = \{x/x^3 = x; x \in Z\}$, $C = \{x/x^3 = x; x \in N\}$ Then verify $A \times (B - C) = (A \times B) - (A \times C)$ 05 M11
- 55 In usual notation, prove that $A - (A - B) = A \cap B$ 05 M11
- 56 If $U = \{x/x \in N; x \leq 10\}$, $A = \{x/x \in N; x^2 < 10\}$, $B = \{2, 4, 6\}$, $C = \{x/x^3 - 3x^2 - 4x = 0\}$ Then verify that 05 M11
 i) $A \cap (B - C) = (A \cap B) - (A \cap C)$
 ii) $A' - B' = B - A$
- 57 In a housing society, 50 residents have scooters, 20 have cars and 15 have both types of vehicles. If there are 60 residents in the society, how many of them have neither scooter nor car? 05 M11

Remark: 1) Que-21 & Que-56 are same.

2) Que-7 & Que-10 are same.